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FIRST

ANNUAL REPORT

OF THE

PRESIDENT AND MANAGERS

OF THE

PHILIPSBURG

AND

JUNIATA RAIL-ROAD COMPANY,

TO THE

STOCKHOLDERS.

NEW-YORK:
G. F. HOPKINS & SON, 44 Nassau-street.

1833.

AT a meeting of the Board of Managers of the Philipsburg and Juniata Rail-Road Company, held on the 29th day of November, 1833, it was

Resolved, That the report of the board to the stockholders, and also the report of Moncure Robinson, Esq. to the board, be published. And at the annual meeting of the stockholders, held at Philipsburg, on the 2d day of December, 1833, the following officers were unanimously elected:

PRESIDENT.
HARDMAN PHILIPS.

MANAGERS.
JOHN NORRIS,
DAVID STEWART,
JOHN S. ISETT,
WILLIAM BAGSHAW,
JOHN MATLEY,
JOHN OWENS.

SECRETARY AND TREASURER.
THOMAS HENRY POTTER.

Philipsburg, *Penn. Dec. 3d*, 1833.

(ATTEST)
THOMAS HENRY POTTER,
Secretary and Treasurer.

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REPORT

Of the President and Managers of the Philipsburg and Juniata Rail-Road Company to the Stockholders.

THE President and Managers of the Philipsburg and Juniata Rail-Road Company have the satisfaction to submit to the Stockholders the accompanying Report of their principal Engineer, Moncure Robinson, Esq., of the surveys and location of the route recommended by him for the construction of the proposed Rail-Road. These surveys have been conducted with a degree of zeal, industry and ability, by Mr. Robinson's corps of engineers, under the immediate direction and superintendence of his principal assistant, Wirt Robinson, Esq., highly honourable to themselves, and altogether satisfactory to the Board: and from the extreme care used in the preparation of the estimates founded upon these surveys, it is confidently believed that perfect reliance may be placed upon them, and that it may be safely assumed that the work can be effected *within* the amount proposed.

For all topographical information connected with the levels of the route, the Board need only to refer to Mr. Robinson's report; but they cannot close this part of the subject without expressing their acknowledgments to that gentleman for having provided them with so efficient a corps of engineers, and for the conduct of the business generally; or without congratulating the stockholders on the highly favourable nature of the route laid down, as fully explained in the report; both from the extraordinary natural facilities that obtain for the construction of the inclined planes, and the decided advantages that result from the circumstance of the *summit level being* $292\frac{25}{100}$*ths feet lower than that of the Portage rail-road at Blair's Gap.*

Without further adverting to information so satisfactorily imparted by Mr. Robinson, the board now proceed to explain to the stockholders, the sources from whence they expect to derive such a revenue, as will afford adequate remuneration for the capital that will be required, and justify the board in strenuously recommending the vigorous prosecution of the work.

These sources of revenue from toll, may be enumerated as follows:

First. From the transportation of *bituminous coal.*

This mineral, the most important of all others to the arts, and the foundation of the commercial prosperity of Great Britain, is found at the western termination of the Philipsburg and Juniata rail-road, in *inexhaustible* quantity, and of a quality, certified by Mr. Skerrett of Philadelphia, (a skilful and highly respectable smith,) after experiments made under the directions of William Strickland, Esq. *to be fully equal to the Newcastle coal,* which is avowedly the best in England. The point at which the rail-road intersects the coal, is nearly the centre of that enormous field, commencing in Tioga county, and extending to the Alleghany and Ohio rivers; throughout the whole of which, at certain levels, it abounds. The openings into the mines are by drifts on the sides of hills, carried into the heart of the coal, in which temporary rail-roads are laid. The dip of the coal in the mines in the neighbourhood of Philipsburg is so small, that by carrying the main entrance across the dip, at a dead level, any extent of field is opened on the upper side; the whole of which may be obtained by the easy process of undermining, and wedging below the roof, which is extremely firm, and will stand in safety by timbering.

The quantity of this important mineral which is thus so conveniently mined, can be limited only by the market — and the following calculation, made by very experienced and competent authority, will demonstrate the decided advantage which this route possesses over its only competitor, the Alleghany portage, in all the markets on the Juniata and further east ; even supposing the coal of the latter to bear any comparison as to *quality ;* which is understood not to be the case.

"The following comparison between the position of the Philipsburg coal mines and those on the line of the Alleghany Portage rail-road, appears to place the former in a very advantageous point of view.

"It is understood, that the coal from the most valuable mines on the Portage rail-road must be introduced at the foot of the first inclined plane west of the summit. Between this point and the basin at Hollidaysburg, the distance by the rail-road appears to be about $12\frac{1}{4}$ miles, the elevation overcome 221 feet, and the descent 1400 feet. Between the basin at Hollidaysburg and the Petersburg pool at the point of termination of the Philipsburg and Juniata rail-road, the distance by the Juniata canal appears to be 32 miles, and the lockage $272\frac{25}{100}$ths feet.

"We have then on the one hand a rail-road $28\frac{1}{4}$ miles long ; more than two-thirds of which, next to the Juniata, presents a beautiful line for the application of locomotive power for a descending business, overcoming a rise of 201 feet, and a descent of 1380 feet ; and on the other, a rail-road of $12\frac{1}{4}$ miles long, but embracing in this short distance nearly an equal amount of rise and fall, the same number of inclined planes, and in addition, a canal and slack water navigation 32 miles long, and with 272 feet of lockage.

"Supposing the cost of transportation on the $12\frac{1}{4}$ miles of the Portage rail-road to be balanced by that on an equal distance of the Philipsburg rail-road next to the coal mines, we have then sixteen miles next to the Juniata admirably adapted to the application of locomotive power for a descending trade ; in competition with 32 miles of canal and slack water navigation involving an unusually large amount of lockage, and subject to the casualties of a river improvement.

"However advantageously canals may compare with railroads for heavy transportation, it would seem, that the railroad in the present instance must be much more advantageously circumstanced; and that coal from the Philipsburg mines might be delivered on more favourable terms than from the Portage, at any point on the line of the Pennsylvania Canal below Petersburg."

The uses to which *bituminous coal* is peculiarly adapted, are domestic purposes, and the arts generally; but more particularly air furnaces, steam engines, smiths' work, the production of hydrogen gas, and in the form of *coke*, to the smelting of ores.

The first of these, although the least in importance, where manufactures are extensively carried on, will probably, on the first establishment of the road, constitute a large proportion of the demand. As *one* ton of coal is fully equal in its effects to *three* (A) cords of wood, whilst it is a much safer and less troublesome kind of fuel, it is very obvious, that, whenever fire-wood costs more than one dollar and fifty cents per cord, and coal can be obtained within five dollars per ton, *the latter* will be preferred for domestic purposes. Now, there is no part of the Juniata district, where fire-wood can be procured for less than $2 per cord; whilst further east, the price is much higher: whereas coal, from the mines in question, could be delivered as far as Harrisburg or Columbia, with reasonable profit, at $5 per ton. It cannot be doubted, therefore, that the demand for these purposes, from Alexandria, Huntingdon, Lewistown, and other towns on the Juniata and Susquehanna, will be considerable; and in addition to the supply required for smithing, and the few rolling mills actually in operation, the quantity may fairly be estimated at twelve times the amount now consumed at Philipsburg, or transported by wagons over the ordinary roads. This would make an aggregate of upwards of sixty thousand tons available on the first opening of the rail-road. If, however, we attempt to look forwards, reasoning by analogy from what has happened in another coun-

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(A) A recent experiment made on board the King William, steam packet, from Pictou, Nova Scotia, to England, exhibits the proportion *as exceeding* three cords of wood to one ton of bituminous coal; and the Ithica and Owego Rail-Road Company rate *four cords* to the ton.

try, in regard to the use of *bituminous coal* for the manufacture of iron and the generation of steam, to the reasonable probability of what may occur in the United States, who can prescribe a limit to the results that may justly be anticipated, or venture to assert, that the improvement now projected by a single track, will, a few years hence, suffice for the tonnage that it will be required to transport?

Down to the year 1740, the *fuel* employed in the manufacture of iron, in England, was entirely *wood;* and so scarce and costly had it become, that the total product of iron made during that year was only 17,300 tons. (B)

Shortly afterwards, however, *coke* was introduced for the smelting of ores, and *bituminous coal* for the puddling and air furnaces; which produced such a revolution in the economy of the manufacture, that in the year 1829, (the latest year to the reports of which the board have the means of referring,) the produce was 700,000 tons, and it is believed to be much greater at this period. Now it is computed, that in the various processes of the manufacture, including the supply of steam power and of fuel for the families at the works, it requires at least (C) five tons of coal, calculated upon the pig

(B) Dudley, a writer quoted by all later authorities, states that in 1619, there were 300 furnaces in England, making each 600 tons of pig iron, or 180,000 tons per annum. According to Mushett and others, it appears that in 1740, (the forests being exhausted,) this quantity had fallen to 17,350 tons, made by 59 furnaces. *Coke* was generally introduced in 1750 or 52, and in 1788, there were

24 Charcoal furnaces making	13,000 tons
53 Coke do	48,200
8 do do (in Scotland)	7,000
	68,200 tons.

In 1796 the quantity made was	108,793 tons.
1820 " " "	400,000
1822 " " "	500,000
1829 " " "	700,000

For further particulars, see Sup. to Encyclopœdia Brit. Vol. 5, part 1st.

(C) Mushett, in treating of the 500,000 tons of pig metal produced in 1822, states, that five millions of tons of coal, of thirty bushels each, were consumed in all the manipulations, and uses attendant upon the manufacture; being at the metal, to make one ton of bar iron. Here then is a consumption in England of 3,500,000 tons of *bituminous coal* in the manufacture of iron alone; and why should not this reasoning apply to the case before us? The whole extent of Warrior Mark Valley, bordering on the proposed rail-road, abounds with inexhaustible mines of the richest Hæmatitie iron ore, which have already been worked to such an extent, as to have caused the almost entire destruction of the timber in that range of country; and it is a well known fact, that the late proprietors of Huntingdon furnace and the Tyrone works disposed of that valuable property, from a conviction, that they could not command a sufficiency of timber to supply their works for eight years more. The present proprietors, with greater sagacity, foresaw that the projected improvement would inevitably be accomplished; thereby conveying to their doors abundance of a species of fuel, by means of which they would be enabled to manufacture iron at greatly reduced rates. On Spruce Creek, (along which it is intended hereafter to carry a branch of this rail-road,) there are six forges in as many miles; where timber has become so exceedingly scarce, that some of the proprietors have been under the necessity of hauling their charcoal over miserable roads, at least nine miles, from the Alleghany mountain. (D)

The use of *bituminous coal* for the puddling and air furnaces is already in successful operation at Pittsburg and elsewhere; and an experiment was last year made at Bald Eagle furnace, on the line of this rail-road, of one-third *coke* to two-thirds of charcoal, and the result was highly satisfactory, inasmuch as it was impossible to discover the slightest differ-

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rate of *ten* tons of coal to *one* ton of pig metal. The board have assumed the lowest estimate for which they have authority, taken from an article in a Welsh paper, on the subject of the iron works of Merthyr Tudfyl.

(D) On hearing the above passage read, a member of this board, part owner and manager of one of the forges on Spruce Creek, remarked, that *he* was under the necessity of procuring a portion of the charcoal consumed at his establishment from a distance of ten miles, and that the team employed for the purpose could haul only one load per diem. The teams used on these occasions commonly consist of six powerful horses.

ence in the quality of the pig metal produced; whilst the burden and yield of the furnace were considerably increased. There was not a sufficiency of *coke* at hand to justify the experiment at a higher proportion, but there is little doubt that, in the present furnaces, an equal quantity of each might be advantageously used. Should it be desired, however, to use *coke* exclusively, loftier furnaces would become indispensable.

With such data before us, is it a stretch of fancy to predict, that, as soon as the coal can be conveyed to the ore at a cheap rate, all the works in the neighbourhood of Warrior Mark and the Little Juniata will have recourse to it for the principal part of their fuel? and if this be the case, with the increased facilities they will possess for manufacturing, is it not reasonable to suppose, that their works will be vastly extended? and, if at all proportionate to the increase of the English establishments, as already noticed, who, we repeat, can be satisfied that a single track will be sufficient, after the lapse of ten years, for the supply of the requisite quantity for the works now established, and those that may be expected to spring up, when the advantages of the situation shall have been better understood and justly appreciated? (E)

The decided advantages in the use of *bituminous coal* for the *generation of steam*, may be comprised under two heads, *safety* and *economy*.

To establish a claim to the *first*, it may be necessary to explain the cause, to which practical men attribute nine-tenths of the accidents, that have happened of late years to steam boats on the waters of the United States.

A reference to most of these cases will show, that they have generally occurred immediately after the boat has left some

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(E) A member of this board has seen an establishment elsewhere in this country, at which the puddling and rolling processes are adopted, where the two materials, *bituminous coal* and pig metal cost the proprietors $68,000 per annum *more* than would be the case, if the works were situated on the Little Juniata, and this rail-road were completed; whilst it is believed, that the advantage of a choice of the eastern or western markets, by means of the Pennsylvania Canal, would counterbalance the advantage possessed by the establishment alluded to, of cheaper access to one great market.

landing place. The practice on arrival at the landing places is, (owing to the uncontrollable nature of a wood fire,) to let off steam, which is often done to such an extent, (particularly on the western waters, where the boilers used are very small, with flues usually passing through them, still further reducing their capacity,) that too little water remains in the boilers to prevent the inordinate action of the fire upon them. In this situation, they become nearly red hot; and when the boat proceeds again on her passage, with the necessity of immediately replenishing them, the forcing pump is set in operation; when, the cold water injected coming in contact with the heated iron, the expansion is so terrific, that it becomes a matter of wonder, not that so *many*, but that so *few* accidents have occurred. Now, with *bituminous coal*, no danger whatever can be apprehended from this source. Five minutes before the arrival of the boat at the landing place, the fire-man opens the doors of the furnace, and throws on the fire a quantity of small coal (and such only ought to be used for steam engines generally,) without stirring the fire: the cold air rushing between this now black mass and the boilers, will prevent any accession of heat; and during the five minutes to elapse before the boat stops, the principal part of the steam previously generated will have been used, and on arrival, none whatever need be let off. When desirable to proceed, it is only necessary to stir the fire, and close the doors; and the boat immediately pursues her way with well filled boilers, and without the slightest danger. As a proof of the correctness of this reasoning, it may be asked, to what other cause is to be attributed the safety of the English steam-boats, which use *bituminous coal* exclusively, and on board of which the explosion which has been recently published, is believed to be the only one which has occurred for many years; although accidents occasioned by carelessness, and coming into collision, do sometimes occur. As, however, one instance of an engine conducted on this plan near home, is worth hundreds at a distance, the board are happy to have it in their power to convey an invitation, on the part of the proprietor of the *Screw factory* at this place, to all practical men, to visit and examine personally the mode practised in the management of his steam engine; from which little or no steam ever escapes, whilst the hands are at dinner, or during the night; and at which, the fire is never suffered to be extinguished, except when it becomes necessary for the purpose of cleansing the boilers.

The *economy* in the use of *bituminous coal* for steam-boats, will depend upon the situation where it may be used: but let us suppose a case on the Hudson river, which is as remote from the mines, as there is any probability of this coal being transported. The large boats on the Hudson consume, during a trip from New-York to Albany, which occupies from ten to twelve hours, from forty to forty-five cords (short lengths) of pine wood, at an average of $4 per cord, equal to 35 cords full measure of 128 cubic feet, at $5 per cord, is . $175 00

With well constructed fire-places, eleven chaldrons of coal would accomplish the same result, which, at $9 per chaldron, at which it is believed it can be afforded, is $99 00

or a saving of nearly one-half, besides occupying only one-fifth of the space, and thereby allowing so much more room for passengers, and diminishing, in like ratio, the cost of handling, &c.

With such decided advantages in its favour for the generation of steam, it is only necessary for the facts to be promulgated, and the article furnished in sufficient quantity, to ensure an immense demand for the supply of steam engines of all descriptions.

For the production of hydrogen gas, for lighting towns, factories, and houses, large quantities of *bituminous coal,* (as the *cheapest material* from which it can be obtained,) are used in England. It is stated, that in London, down to 1830, one thousand miles of pipes for lighting the streets had been laid, and that the consumption of coal for this purpose, was 38,000 chaldrons during that year. In Liverpool and Manchester, it is believed, the consumption is much greater, in proportion to the population; as, in the former place, gas is more in use for lighting private houses, (into which it is introduced by the gas companies, who provide the apparatus, receiving their remuneration according to the quantity of gas actually used, which is determined by a gauge connected with the reservoir or gasometer;) and in the latter place, the ordinary consumption is still further increased by the enormous supplies requisite for the factories. But the use of gas is not confined to large towns: there are few places, of even inconsiderable size, that are not lighted by it; and a member of this Board remembers to have seen it employed even for lighting a solitary turnpike gate between Stockport and Macclesfield.

The mode of extracting the gas from *bituminous coal* is by a very simple process of distillation; in the course of which, tar and ammoniacal liquor are also disengaged, the residuum in the retort being *coke.*

The following estimate of the product of one chaldron of coal, subjected to this process, is taken from page 186 of "Cooper on Gas Lights," to which work the Board beg to refer for a mass of very interesting information on the subject, comprising the evidence of many scientific and practical men, taken before a committee of the House of Commons.

"One chaldron of coal (from 25 to 28 cwt. or 36 bushels,) produces from 1¼ to 1½ chaldrons of coke: from 150 to 180 lbs. of tar, at 10 lbs. the gallon: from 220 to 240 lbs. or 22 to 24 galls. of ammoniacal liquor, and about 10,500 cubical feet of gas."

At present the public mind in this country is too much divided respecting the expediency of the use of gas, to justify the Board in laying much stress on this subject, as a source of immediate revenue; but as soon as science shall have gained her victory over prejudice (which, though it may be retarded, cannot be averted,) it surely may be assumed, that the demand for *bituminous coal* for this purpose will add very materially to the tonnage of the Philipsburg and Juniata rail-road.

Secondly. On the transportation of the iron ore, pig metal and bar iron, of the Juniata district, (the most justly celebrated in the United States for its quality.) This rail-road will pass through the very heart of the region of Hæmatitic iron ore mines; and there are already twenty-two forges and furnaces, within convenient distance of it, employed in the various processes of the manufacture of bar iron, blooms, &c. The business connected with these establishments, such as conveying the ore and limestone to the furnace, the pig metal to the forge, the blooms and bar iron to the Pennsylvania canal, for transportation either east or west, cannot fail to supply a large amount of tonnage to the rail-road; and may reasonably be estimated, in the present state of the country, at 10,000 tons per annum.

The remarks made as to the future probable increase of the coal trade, apply with equal force to this source of revenue; and *when the fact is taken into consideration, that by an intermediate link of only eight or ten miles in length, two regions, the one abounding with the finest* BITUMINOUS COAL, *and the other with the best Hæmatitic iron ore, can be connected;* and these again brought into immediate communication with the eastern or western market, by the state improvement already accomplished, it is not apprehended, that any impression of the future destinies of two sections of country so situated, will be deemed too highly coloured in this report.

Thirdly. Lumber of all descriptions will constitute an important article of tonnage to the rail-road company. The almost interminable forests of the finest timber of every kind west of the Alleghany mountains, and immediately on the line of the rail-road, (with sites suitable for the construction of either water or steam power,) will prove a never-failing source of revenue to the company.

From causes explained under the head "*Coal*," timber has become extremely scarce in the Juniata district, where the market for it is, in consequence, very favourable. For the supply of the lower country, it may be rafted down the Juniata river at a very trifling expense, the navigation being exceedingly safe below the mouth of the Little Juniata.

In the year 1832, being the first year of that trade, the Delaware and Hudson rail-road passed 3,000,000 feet of lumber; and during the present season, up to the 22d October, 4,436,423 feet; and next year they fully calculate on the transportation of 6,000,000 feet of lumber ; thus showing a rapidly progressive increase in this unexpected source of revenue. For this article, the board anticipate, in the first instance, tonnage, equal to 6,000 tons.

Fourthly. The interchange of commodities of an agricultural character will constitute an important item in this catalogue. The fertile valleys of Warrior Mark, and Sinking Valley are contiguous to this rail-road; and that of Half Moon is sufficiently near to look to it for commercial facilities. These valleys receive large supplies of Plaister of Paris, salt, fish, groceries, &c. &c. and send away in return large quantities of wheat, flour, butter, whiskey, &c. Limestone is likewise an article of importance for a portion of the route ; and fire-clay, of the same character as the Stourbridge, which is found in regular strata under the coal, may be fairly calculated upon as an article of commerce. These several sources of tonnage may, with moderation, be rated at 8000 tons per annum.

Fifthly. Merchandise generally. Already the merchants of Meadville, Franklin, and other western parts of the State, are in the habit of sending wagons, which must necessarily pass the Alleghany and Seven Mountains, to Lewistown, a distance of 60 miles east of Philipsburg, for their merchandise and general supplies, which had been forwarded from Philadelphia or Baltimore, by the canal to Lewistown. If they could save sixty miles of land carriage, part of it over the most mountainous district of the State, it is not to be supposed that they would *volunteer* such useless expense. It may safely be assumed, therefore, that the merchandise for Philipsburg, and every place west of it as far as lake Erie, would be forwarded by the Philipsburg and Juniata rail-road. The amount at present is conjectural; it surely cannot be overrated at 1000 tons. But this source of revenue will necessarily be much increased by the rapid developement of the resources of the country, the increase of population, and the agricultural improvement of the immense tracts of fertile but uncultivated land lying between the western termination of the rail-road and lake Erie.

The following recapitulation, then, will exhibit an estimate of the tonnage which will be *immediately* available from the first opening of the rail-road for the conveyance of tonnage, independently of the extensive demand for *bituminous coal*, that may reasonably be calculated upon in the Atlantic cities.

Coal, ...	60,000 tons.
Iron ore, pig metal, blooms, bar iron, . .	10,000 "
Supplies for agricultural purposes, and products of agricultural labour, ...	8,000 "
Lumber, ...	6,000 "
Merchandise, . . - . . .	1,000 "
	85,000 tons.
Averaging 24 miles, at 2½ cts. . .	$51,000

Which would be amply sufficient to authorize a dividend of ten per cent. on the capital stock of $300,000, requisite for the accomplishment of this important enterprise; besides allowing $21,000 per annum for the necessary repairs of the road, renewals of ropes, attendance at inclined planes, labourers, superintendence, and the formation of a contingent fund, &c. In this calculation, it will be observed, no estimate whatever is made for the conveyance of passengers. When it is recollected, however, that this will form the most direct and easy communication through the centre of the state to the lakes, it cannot be doubted that the travelling over this rail-road will be considerable: but let us suppose only twenty passengers per diem at 50 cents each, and this apparently insignificant item would add $3,000 per annum to the revenue of the company.

It is to be observed, that the above calculations have been made on the tonnage believed to be available, without having recourse to any markets beyond Harrisburg or Columbia.

The Board will now present a view of the actual cost of delivering coal at Philadelphia, by the Union and Schuylkill Canals; and it will be for the public to judge, whether the difference between that cost and the ordinary selling prices on the seaboard, will not afford sufficient margin for all reasonable profits and agencies; and also to enable this coal to enter fairly into competition with any other whatever. As soon as the State improvements shall have been completed, by the continuation of the Pennsylvania Canal from Columbia to tide-water, a much cheaper outlet will be provided, not only to Philadelphia, but to the whole Atlantic coast, both by materially curtailing the distance of canal navigation, and permitting the use of much larger boats, as the Pennsylvania Canal is constructed for boats carrying from 50 to 60 tons; whereas, on the Union Canal, boats conveying 30 *tons* are the largest that can pass the locks. The calculation for this reason, is made on a boat load consisting of *only thirty* tons.

Actual cost of 30 tons of coal, delivered at Philadelphia, per rail-road, and Union and Schuylkill Canals.

Digging and delivering into the rail-road cars, 30 tons of coal, at 1½ cent per bushel — 32 bushels to the ton, or 48 cents per ton, .	$14 40
Toll on rail-road, as fixed by act of Assembly, 2 cents per ton per mile, 28 miles, .	16 80
Cost of transportation on rail-road, at the rate, at which, agreeably to the recommendation of the Engineer, it is intended to apply to the legislature, to constitute the company public carriers, same as toll, . . .	16 80
	$48 00
Loading into canal boats, 10 cents per ton,	3 00
Amount carried forward, . . .	$51 00

Amount brought forward, . . .		$51 00
Tolls on Canals.		
On Pennsylvania Canal from rail-road to Middletown, 124 miles, at ½ cent per ton per mile, as per printed list,	$18 60	
On Union Canal, 80 miles at ¾ cent per ton per mile, as per printed list,	18 00	
On Schuylkill Canal, 60 miles, at 1½ cent per lock, on 32 locks charged for, or 48 cents per ton, . .	14 40	
Charge on return boat, if empty, on Schuylkill Canal, . . .	1 22	
	$52 22	52 22
		$103 22

Boating.

One man, one boy and one horse form an adequate appointment for a boat of 30 tons, which will travel on an average 26 miles per diem—total distance from rail-road to Philadelphia, 264 miles, the double of which 528 miles will occupy 20½ days—then

1 man per diem, . .	$1 00	
1 boy do do . .	50	
Keep of one horse per diem,	50	
	$2 00 × 20½ days,	41 00

(N. B. In this calculation, no deduction is made for back loading, but the coal is charged for the return of the *empty* boat. Now the general transportation by the canal westward so greatly exceeds that bound eastward, that there can be no doubt of obtaining *more* than sufficient freight to defray the returning expenses of the boat; if so, at least one half of this item should be deducted.)

Amount carried forward, . . .	$144 22

Amount brought forward,		$144 22
Use of Boat and Horse.		
Cost of boat	$250	
Use thereof for 20½ days at 20 per cent. per annum, of 9 months of navigation,		3 70
Cost of horse and gears,	$100	
Use thereof for 20½ days at 20 per cent. per annum, for use and risk of death,		1 11
Prime cost of 30 tons, on board the boat at Philadelphia,		$149 03
Or per ton,		$4 97

The distance from the eastern termination of the rail-road to Philadelphia, by the Pennsylvania Canal, and the Columbia rail-road, is 224 miles.

By the same course, and the York Haven and Baltimore rail-road to Baltimore, 201 miles.

By the Pennsylvania Canal and Portage to Pittsburg, 172 miles.

As, however, the tolls on those rail-roads are not yet determined, no estimates can be submitted, as a comparison with the cost of transportation by the Union and Schuylkill Canals.

It is intended by the Board to make early application to the Legislature, for certain alterations in their act of incorporation; the most important of which are, to extend the limitation of the period for the completion of the work — to authorize the augmentation of the capital stock to $350,000, and to make it incumbent on the company to provide the necessary cars, horse and steam-power, for the accommodation of the trade, and constituting them public carriers, at a specified increase of tolls. This plan is adopted upon the recommendation of the Chief Engineer, as the only mode of conveying the immense amount of tonnage which this rail-road will be required to transport.

Numerous contractors are on the alert, to take the work upon extremely favourable terms, and it is believed below the estimates. The whole of the route is staked out, ready for the commencement of operations, and no doubt is entertained but that the rail-road will be in readiness for the conveyance of goods in eighteen months from the date of this report; provided the remainder of the stock be speedily subscribed. But it has been urged, if the project be so feasible, and the advantages so certain, how happens it, that the balance of the stock has not been furnished by the "*wealthy* iron masters" near the line of the route? If this epithet were applicable, the argument would be unanswerable: but, unfortunately, (and the Board are not apprehensive of giving offence by the admission of the fact) the case is far otherwise. The spirit of enterprise which characterizes the owners of the iron works, being more than commensurate with the extent of their capitals, there are few, if any, who are not carrying on their business to the very extreme of their ability: and so great has been the apprehension of a want of fuel, that all savings (and more frequently, it may be admitted, before they are realized) have been devoted to the purchase of timber land.

The Board unqualifiedly admit, that the iron masters have subscribed to the extent of their ability, and that they successfully exerted their influence amongst their working people, to obtain subscriptions from them; which produced the good effect of completing the amount of stock, prescribed by law as necessary to obtain the charter of incorporation. It is hoped, then, that capitalists at a distance will not condemn the enterprise on an assumption of reasoning, for which there is no foundation; but that they will deliberately investigate the circumstances of the case, and decide accordingly.

It may be expedient at this point to notice another objection that has been suggested; to the effect, that some rail-roads are in bad repute, and that many have not realized the expectations of the projectors, &c. &c.

Now, in reply to this, it is the opinion of the Board, that the success of every enterprise of this description must necessarily depend upon two circumstances — 1st, a sufficiency of tonnage — 2d, such natural facilities for the construction of the road, as, with proper economy in the management of affairs, will prevent the expenditure from being disproportionate to the income. Rail-roads have, in various instances, been constructed at an enormous expense, where the toll has depended almost exclusively on passengers. If, under such circumstances, the stockholders experience any disappointment, whom have they to blame? or should this form an argument against rail-roads in general?

As the most satisfactory proof, however, that wherever *the tonnage* is proportionate to the cost, no disappointment has ensued to the proprietors, the Board beg leave to subjoin the current prices of some of the rail-road stocks in England, as reported in the latest papers.

	Cost price.	*Selling price.*
Stockton and Darlington rail-road,	£106 13 4	£297 10
Liverpool and Manchester do.	100 0 0	210 0
Do. do. (later subscription,)	25 0 0	52 0

In reference to the *Philipsburg* and *Juniata rail-road*, on the *first point*, the Board confidently trust, that sufficient has been said to demonstrate most satisfactorily, that so long as *bituminous coal*, *iron* and *lumber*, shall be essential to the arts and the conveniences of life, no deficiency of tonnage can possibly be apprehended — and on the *second*, they have only again to refer to the annexed lucid report of Moncure Robinson, Esq.

All which is respectfully submitted.

Signed by order of the Board,

HARDMAN PHILIPS, *Pres't.*

PHILIPSBURG, Penn., Nov. 29, 1833.

Attest. — THOMAS HENRY POTTER,
Secretary and Treasurer.

To the President and Managers of the Philipsburg and Juniata Rail-Road Company.

GENTLEMEN:

I HAVE the honour to submit to you the following report on the location made by the party of Assistants acting under my direction, of the Philipsburg and Juniata rail-road.

It appeared from a careful reconnoisance made by my principal assistant, Mr. Wirt Robinson, that no part of the Alleghany mountain within the range of the contemplated improvement presented as decided a depression of the summit as the pass of the mountain usually denominated Emigh's Gap, and that particular facilities for approaching the summit of the mountain at this point existed both on its eastern and western slopes. The preliminary surveys were in consequence limited to an ascertainment of the most advisable combination of lifts and levels for passing the mountain, and a selection of the most favourable ground for a graded road along the Bald-Eagle and Juniata valleys.

These surveys were so far extended as to embrace the fullest topographical views east and west of the summit, and a line was then traced which has been since revised, and which is now believed to be in all its essential points located to the best advantage.

The line as traced on the ground may be thus described. Commencing at the Coal-Hill coal mines, at a level ten feet lower than the entrance of the principal drift, it passes on gently sloping ground and on a level graduation to the foot of an inclined plane noted in the plan as "No. 2 west," by which it ascends 143 feet and $\frac{8}{10}$ths to a depression in the dividing ground between the waters of the Cold-Stream and Moshannon — passing this dividing ground by a cut of 9½ feet, it is thence traced on a graduation, also level, to the foot of inclined plane "No 1 west," by which it rises 118 feet to the summit level.

Passing the summit by a cut of 1100 feet long and 11 feet and $\frac{6}{10}$ths deep at its apex, it descends by a plane "No. 1 east" 272 feet into the valley of Emigh's Run; along the western slope of which it passes $4\frac{1}{2}$ miles, falling 655 feet more by three inclined planes and intervening grades of from 22 to 24 feet per mile: at the foot of plane "No. 4 east," it leaves the valley of Emigh's Run, and afterwards passes along the western slope of the Bald-Eagle valley to near the mouth of the Bald-Eagle creek. At this place it crosses the Bald-Eagle, and is traced thence along the valley of the Little Juniata, crossing this stream four times between the mouth of Bald-Eagle and its point of termination near Petersburg. The whole length of line traced is twenty-eight miles and 1247 feet; its whole ascent above the coal mines is two hundred and sixty-one feet and $\frac{79}{100}$ths, and its whole descent thirteen hundred and eighty feet.

The accompanying plan and profile will furnish to the Board all farther information in relation to the position of every part of the line. It will be seen on reference to it, that the inclined planes are embraced in a distance of less than 9 miles, next to the point of commencement near Philipsburg; that the remainder of the road, upwards of nineteen miles, is on a graduation for a descending trade well adapted to locomotive power. The whole number of inclined planes, it will be observed, is but six. The small lift of the two planes west of the summit, may perhaps induce the impression, that a single plane might have been attainable, and that its substitution for the two planes which have been adopted would have been desirable.

An examination of the plan referred to will show the remarkable depression between planes "No. 1 and 2 west," through which the line of the rail-road is traced, and which would have made it impracticable to continue the summit level to any point in the neighbourhood of the coal mines, and there to have descended by a single inclined plane. The rapid ascent of the valley in which the coal mines open, would have made it equally so, to have extended the level graded stage next to the mines, or any advisable graduation sufficiently far, to have admitted of rising to the summit level at any other point by a single lift.

It is doubtful, however, whether this modification of the profile, if it had been attainable, would have been at all desirable. The line as at present located admits of a supply of water being obtained at the head of plane "No. 2 west," adequate to raising the largest amount of tonnage which can ever be anticipated; and a steam engine of very moderate power will be adequate to that of the plane next to the summit. Had the two planes been merged into one, an engine proportionally more powerful would of course have been requisite; and the capability of the rail-road for the accommodation of a very large business have been also in some degree impaired.

It will be proper in this place to make a few remarks on the character of the improvement which is contemplated.

The road-way formation of the whole road, it is proposed, should be for a single track rail-way, except at the inclined planes and for a distance of three or four hundred feet from the head and foot of each plane, on which two tracks would be laid. Under proper regulations, and with transportation effected by the company, the experience of similar works both in England and this country shows, that such a work would be entirely adequate to a trade of from 150,000 to 200,000 tons per annum; an amount probably equal to any calculations or views of the Board, and far beyond that which a double track road would accommodate, if a public highway.

The style of construction which is proposed for the graduation of the road would be simple, but substantial and permanent; the proper levels would be attained by cuttings and fillings, unless at a very few points where it might be an object to make use of frame-work in the first instance, to be substituted hereafter by embankments; and at streams and ravines where, of course, bridges or other passages for water as well as embankments would be requisite. Few bridges beside those at the crossings of the Bald-Eagle and Juniata would be required, and proper materials for the construction of plain and substantial abutments, would be obtained generally within a convenient distance.

The following plan is proposed for the superstructure of the rail-road.

Sills of white or post oak, seven feet ten inches long, and twelve inches in diameter, flatted at bottom to a width of 9 inches, to be laid transversely the road, at a distance of five feet apart from centre to centre. In the notches of these sills, rails of white oak or heart pine, 5 inches wide, by 9 inches in depth, to be secured four feet seven inches apart measured within the rails. On the inner edges of these rails, plates of rolled iron, two inches wide by half an inch thick, resting at their points of junction on plates of sheet-iron, $\frac{1}{16}$th of an inch thick and $4\frac{1}{2}$ inches long, to be spiked with five inch wrought iron spikes. The inner edges of the wooden rails to be trimmed slightly bevelling, but flush at the point of contact with the iron rail, and to be adzed down outside the iron to pass off rain-water. Between the sills on the portion of the road between plane "No. 4 east" and the Juniata, and on the inclined planes, to be filled with a packing of broken stones or other convenient material to give stability to the structure; and on the other portions of the road a horse path to be formed.

Such a superstructure as that above described would be entirely adequate to the use of locomotive engines of from 15 to 20 horse power constructed without surplus weight, or similar to those now in use on the Little Schuylkill rail-road in this state, or the Petersburg (Virginia) rail-road; and it will be observed that only the sills, which constitute but a very slight item in its cost, are much exposed to the action of those causes which induce decay in timber. It is particularly recommended for the Philipsburgh and Juniata rail-road by the great abundance along the line of the improvement of good materials for its construction, and the consequent economy with which it may be made.

The following may be deemed an average estimate of the cost of a mile of superstructure as above described.

1056 trenches 8 feet long, 12 inches wide, and 14 inches deep, filled with broken stone, at 25 cents each,	$264	
Same number of sills, hewn, notched and imbedded, at 50 cents each,	528	
10,912 lineal feet of rails (allowing $33\frac{1}{3}$ per cent. for waste) at 4 cents per lineal foot, delivered,	436	48
2,112 keys, at $2\frac{1}{2}$ cents each,	52	80
10,560 lineal feet of plate rails, 2 inches by $\frac{1}{2}$ inch, weight $3\frac{1}{3}$ lbs. per foot, $15\frac{71}{100}$ tons delivered at $50 00 per ton,	785	50
1,509 lbs. of 5 inch spikes, at 9 cents per pound,	135	81
Sheet iron under ends of rails,	30	21
Placing and dressing wooden, and spiking down iron rails,	280	
Filling between sills with stone, or horse path,	180	
	$2,692	80

The machinery of the planes should be correspondent in character with the road-way formation and superstructure of the rail-road, or as simple and economical as would be consistent with efficiency in working and economy in repairs. As the descending trade would largely preponderate, if the transportation was effected by the company, (and this with a single track rail-road may be deemed essential, if not indispensable,) self-acting planes *only* would be required east of the summit. West of the summit, power of course would be requisite; but a supply of water, in adequate quantity, (as has been before observed,) can be obtained at all seasons for the most considerable of the planes, and for the light plane next to the summit, a steam engine of moderate power only, would be required. Indeed this might even be dispensed with, if it were deemed advisable, for some years to come; as a sufficient volume of water for working it, may be obtained at the head of the plane during the greater part of the year, and at other times the requisite power might be obtained (without any change in the gearing of the plane) by the use of horses operating on the wheel at the head of the plane, by the simple arrangement of a horse-gin.

The self-acting planes east of the summit would be provided with chains. I am aware that high authority exists against their use, and that, the cases of their application in our country, have so far not been successful. It is believed, however, that this has resulted from causes which may be avoided on the Philipsburg rail-road, and the great durability of chains compared with ropes, whilst their first cost is but very little greater, makes it important to adopt them if practicable.

The causes which have led to their abandonment in the cases in which chains have been employed in our country, are believed to be,

1st. Their adoption in a class of cases in which they are least available.

Chains are not applicable to gentle planes, or to planes of the slight acclivity generally adopted in England and in the cases in which they have been given up in this country. When used on such planes they must be subjected to a very considerable degree of *tension*, and of course to a proportional friction and wear and tear of the chain and other parts of the machinery. On the Carbondale rail-road during the period of their use, it was found necessary to place the wheel around which the chain passed, at the foot of the plane, on a moveable cradle, to admit of the chain being stretched with convenience, on account of any slight increase in length. Such a precaution would certainly be unnecessary on planes of 7° of steepness and upwards; and the chain might obviously be allowed to hang more loosely on the plane in proportion as its acclivity was increased.

The liability to flaws to any given extent, it is obvious also, is equally great in a small chain and in a large one, and the exposure to accidents is consequently largely increased on a gentle plane, on which of course the dimensions of the chain employed should correspond (unless a large waste of power be allowed) to the acclivity of the plane.

2d. In the cases in which chains have been given up, the machinery employed does not appear to have been the most appropriate. The wearing of the chain was against cast iron wheels, at the head and foot of the plane, and on sheeves similar to those usually employed for rope-rolls. On the Philipsburg planes, it is proposed that the wear of the chain should be on an oaken rim, secured between an upper and lower cast iron plate, and grooved to receive each alternate link of the chain: and that the sheeves should be cast with similar grooves. The wear of the chain with such arrangements will certainly be greatly diminished and it is believed will not prove serious.

3d. The chains employed in the cases in which they were given up, were of American manufacture and confessedly very inferior. In almost every case of a failure an examination of the broken links of the chain showed it to be in consequence of an imperfect weld. It is recommended that the chains for the Philipsburg planes should be obtained from some establishment of high reputation in England, and subjected before shipment to the most decisive proof.

With the precautions suggested, no doubt is entertained that on the self acting planes of the Philipsburg rail-road, the most gentle of which has an acclivity of 1 in $8\frac{1}{4}$ feet, chains may be used to great advantage. Presuming the expectations entertained in relation to them, to be realized, the cost of their renewal, and the other repairs of the planes, would be a very slight item, and constitute but a small deduction from the annual receipts of the company.

West of the summit steeper planes than those adopted could not conveniently be obtained; and ropes will be advisable on those which have been located. The whole elevation of these two planes, is, however, (it will be observed) less than that of plane "No. 1 east," and the expense of renewing ropes on them will, in consequence, be very moderate compared with what would have been requisite, had they been adopted also on the planes east of the summit. It is nevertheless proposed to diminish as far as possible this item in the repairs of the road, by roofing the two western planes.

Description of Route.—Section 1st.

From the coal mines to station 12, two hundred and fifty feet back of plane "No. 1 East," (embracing the summit level) 3 miles and 2,535 feet.

The excavation in this distance is sometimes hard and stony, but the line passes over ground, presenting generally (except at the summit, and for a short distance between planes "Nos. 1 and 2 west,") small variations from grade, and easily formed into a road-way. The plane formation would be particularly light, and the cuts between the two planes and at the summit, would probably present only detached rock and earth.

The machinery proposed for these two planes, would consist of an endless rope passing around horizontal wheels at the head and foot of the planes, and a third wheel placed in a moveable cradle, through which the necessary friction and adhesion would be given to the rope by a purchase connected with the cradle, or a weight suspended in a well near the head of the planes. This plan, as before observed, is preferred to chain machinery, (which would be adopted east of the summit) for these two planes, on account of their gentle slope, for which, chains would not be advisable.

The power applied to plane "No. 1 west," might be a steam engine of twenty horse power, which, until the demands of the trade required its full effect, would be available for sawing timber, or other purposes. For plane "No. 2 west," it is proposed to conduct the water of the Cold Stream in pipes, one mile and 190 poles, along very favourable ground to a reservoir at the head of the plane, placed at such an elevation as to admit of filling cisterns, mounted on carriages, carrying from 3 to $3\frac{1}{2}$ tons of water. These cisterns to be used as in the ordinary operation of self-acting planes, to lift up trains of loaded coal cars; and in turn, the empty cisterns to be lifted back to the head of the plane by returning trains, or the occasional use of a loaded cistern. The expedient recommended, has been adopted on the line of the Danville and Pottsville rail-road; and although the planes on which it is to be employed are not yet in operation, no doubt is entertained of its realizing, both in efficiency and economy, every expectation which has been entertained in relation to it.

Section 2d.

From station 12, near the head of plane No. 1 east, to station 191, 250 feet back of plane No. 3 east, 3 miles and 93 feet.

The line in this section, with the exception of planes Nos. 1 and 2 east, and a short distance near the end of the section, is on ground sloping generally between 18° and 30°, and presenting often, masses of detached rock. The outline of the ground is also in some cases irregular, making it necessary, in order to procure an eligible line, to encounter occasionally deep cuttings and fillings. Fast rock will be met with in some of the former; but the difficulties in the way of the road-way formation, are not at any one point serious.

The first of the planes embraced in this section descends 272 feet, the 2d 210 feet. The Plane formation of the first would present a short distance of cutting 15 feet deep, and some filling varying from 10 to 12 feet; and large detached rock and some fast rock would be encountered near the foot of the plane. The location of plane No. 2 is an extremely economical one, and was adopted, because it was seen that any change in the line at this point would be attended with an enhancement of cost. It is however liable to the objections of lengthening the line about 750 feet; of being steeper than would be advisable even with the chain machinery, which is proposed; and that a very short curve would be necessary in leaving it. I would recommend the change in the line at this point, shown in the topographical plan marked "A." In the event of this change being made, it would probably be advisable to increase the descent of the plane from ten to fifteen feet, and to lower to the same extent the graded stage between the foot of the plane and the end of the section.

The two planes embraced in this section would be self-acting. The machinery proposed on them would consist of chains, passed around horizontal wheels firmly secured at the head and foot of the plane; the wheel at the head of plane No. 2 being controlled by the action of the windbrake or pneumatic convoy. The wheéls at the head and foot of the planes (as before described) would be so constructed, that the wear of the chain would be on wood, and the sheeves cast with grooves to receive each alternate link.

Section 3d.

From station No. 191, near the head of plane No. 3 east, to station A. 230 feet beyond the foot of plane No. 4 east, 2 miles and 2137 feet.

The line at the beginning of this section, falls by plane No. 3 east, 153 feet, in a distance of 870 feet. It afterwards descends $\frac{45}{100}$ths per hundred feet, or a little less than twenty-four feet per mile to the head of plane No. 4 east, by which it is lowered 187 feet in a horizontal distance of 965 feet.

The graduation of the planes at the commencement and termination of the section, presents but little difficulty; but the line between them passes over very irregular ground; and cuttings of some depth, and at two points, fillings of 35 feet will be required, in obtaining the proper graduation. Some rock may be expected in the excavation, but the proportion will not probably be large, and the amount allowed in the estimate is believed to be fully sufficient.

The inclined planes, as in the case of planes Nos. 1 and 2 east, will be self-acting, and will be arranged as No. 1; that is, with chains and horizontal wheels at the head and foot, but without the windbrake or pneumatic convoy; which will only be required at No. 2 east, in the event of the adoption of the steepest of the two planes located.

Section 4th.

From station A. below the foot of plane No. 4 east, to station 600, beyond the crossing of Bald-Eagle Creek, 5 miles and 567 feet.

The line, in this distance, passes along ground having generally gentle slopes, and presenting very little rock or other difficult excavation, but a good deal torn by small streams and ravines. Two of the former, Moore's saw-mill run, and Laurel-run, will require bridges. The remainder may generally be passed by single or double drains of the largest class.

Much heavier embankments will be required on this portion of the line, than I had been induced to believe, from the experimental lines first traced would be requisite. The line has been so located as to diminish these as far as practicable, consistently with what was due to directness and curvature; but the expense of the road-way formation of this portion of the rail-road is so much greater than I had expected, that I would recommend, before commencing the execution of the work, the trial of a line, leaving that at present located at the foot of plane No. 4, crossing the valleys of Emigh's Run and Bald-Eagle, between the Bald-Eagle furnace and the forks of the streams; and afterwards passing along the eastern slope of the Bald-Eagle Valley. This line would probably be longer than the one adopted, and the embankment at its commencement would be a very heavy one, but it might *possibly* prove on the whole to combine more facilities than the line which has been traced.

The graduation of the road along the Bald-Eagle Valley, it will be observed, is an uniform one of 42¼ feet per mile. Some saving might be effected by adopting a steeper grade next to the foot of plane No. 4 east, and a gentler grade below, instead of the average which has been adopted. It is not believed, however, that any saving which could be effected by a change of the profile as suggested, would justify the injury to the line which it would occasion.

Section 5th.

From station 600 to station 764, a short distance above Birmingham, 2 miles and 4,910 feet.

The line in this section passes along the valley of the Little Juniata, which is crossed by a bridge 200 feet long, a short distance below the Tyrone works. Opposite the Tyrone forges, and for some distance above and below, the road-way will be formed against a steep cliff, and will be secured against the abrasion of the stream by a protection of loose stone. A short distance below, a limestone cut 500 feet long and 20 feet in depth at its apex will be encountered: the other difficulties of the section are but slight.

The bridge in this section and the others across the Juniata would be on the lattice, or truss plan of Town.

The graduation of the first 2900 feet of this section is at the rate of 37 feet per mile. For the remainder of the section the line is adjusted on a graduation of $\frac{28}{100}$ths per one hundred feet, or 14$\frac{3}{4}$ths feet per mile.

Section 6th.

From station 764, a short distance above Birmingham, to station 1068, opposite Spruce Creek, five miles and 2775 feet.

The valley of the Juniata presents in this section, very little bottom land, and although two crossings of the river are encountered to improve it, the location is necessarily made at many points along the river cliffs. At such places a road-way would be formed in part by excavation, but generally by filling against the hill and protecting with loose stone; except at a few points, where a slope wall or regular pavement might be advisable.

The first crossing of the river is made near the point of a small island about 2$\frac{3}{4}$ miles below Birmingham. The crossing at this point would be effected by extending a causeway, protected on the upstream side by a slope wall into the river, so as to reduce the length of the bridge to about two hundred feet. The second crossing of the river is about one and five-eighth miles lower down, and a short distance above Mrs. Laws. A bridge of the same length as at the upper crossing, would be necessary here.

The line for the first $2\frac{1}{2}$ miles of this section, is traced on a graduation of $\frac{34}{100}$ths per hundred feet, or 18 feet per mile. The descent is then $\frac{28}{100}$ths per hundred feet, or 14 and $\frac{2}{3}$ds feet per mile, for a distance of two miles and 731 feet; after which a graduation of 13 feet and $\frac{2}{10}$ths is adopted for the remainder of the section.

Section 7th.

From station 1068, opposite Spruce Creek, to station 1325, at the termination of the line on the Pennsylvania canal, 5 miles and 4,070 feet.

The line for the first 4000 feet of this section is traced on a graduation of 13 feet per mile, on the southern bank of the Juniata, on ground presenting little difficulty except at one point, where a protection for a few hundred feet will be requisite. It afterwards passes through a spur of the Tussey Mountain by a level tunnel 1,300 feet long. On leaving the tunnel it descends for 1 and $\frac{3}{4}$ths miles on a graduation of $\frac{44}{100}$ths per hundred feet, or 23 feet per mile through the gap of the mountain. The road-way for one half this distance will be formed at a considerable elevation above the river, and among masses of loose stone, and for about 1,100 feet afterwards, along a very steep cliff, where an embankment in the stream and protection wall of loose stone will be requisite.

After leaving the gap of the Tussey Mountain the flats of the Little Juniata become wide on both sides of the stream, and a very direct line is traced through them, crossing the Little Juniata about two miles above its termination, and passing through lands belonging to Dorsey's heirs, Jackson, Bluebacher and Neff. The grades on this portion of the line are adjusted so as to require the minimum amount of embankment, consistent with a proper elevation at the point of crossing the river, and the requisite elevation for staiths and coal-shutes at the termination, and vary between a level and 22 feet per mile. The trace of the road near its termination is parallel to the Petersburg Pool, and 190 feet from it, to afford room for slips and docks; and the termination of the line is at a point about 1,000 feet from the dam.

The principal item of expense in this section, it will be seen, is the tunnel. Something might be gained in first cost by dispensing with it, and passing around the spur of the mountain, through which it would be excavated; but the line would be lengthened between $\frac{3}{4}$ths of a mile and a mile in distance, and in other respects (as will be seen by reference to the topographical plan) very much impaired.

The total cost of the Rail-road, and that of each particular section, extracted from the estimates which accompany this report, will be exhibited by the following

Summary.

Section	1st, 3 miles and 2,585 feet,	$41,110 05
"	2d, 3 miles and 93 feet,	31,039 53
"	3d, 2 miles, and 2,137 feet,	29,825 26
"	4th, 5 miles and 567 feet,	49,328 28
"	5th, 2 miles and 4,910 feet,	28,726 18
"	6th, 5 miles and 2,775 feet,	40,443 75
"	7th, 5 miles and 4,070 feet.	56,820 33
		$277,293 38

It will be observed, that the above aggregate embraces no item for superintendence and contingencies. This, under ordinary circumstances, would be placed at 7 per cent. It has, however, been omitted in the present instance, because, whilst it has been deemed proper to predicate the estimate in all cases on the line actually traced, it is not doubted that on a further revision, savings might be made in it to a considerable extent, and probably sufficient to balance this item.

The estimate will probably appear to professional men a low one, for a line of lifts and levels to connect the Alleghany coal-field and the Juniata canal, but will probably be found somewhat higher than the Board of Managers have contemplated. Aware of the many facilities afforded for their railroad, the comparatively few difficulties of moment presented in its route, have been naturally under-estimated. On comparing, however, the estimate above submitted, (*and which is believed with good management to be entirely adequate to the proposed improvement,*) with the cost of other works executed under similar circumstances, the results arrived at, ought, it would seem, to be entirely satisfactory. The first ten miles of the Danville and Pottsville rail-road, or the portion crossing the Broad Mountain, graded for a double track, but with a single track only laid down; (and which will but slightly exceed the original estimate,) will amount to about $220,000. The Honesdale and Carbondale rail-road 16⅓d miles long, a single track rail-road, and executed for a considerable portion of its length on truss work, is understood, including machinery, to have averaged $18,000 per mile. *When the permanent style of execution contemplated for the Philipsburg and Juniata rail-road is considered, it is evident that great facilities must exist in the line of the proposed improvement to admit its execution for a sum comparatively so small.*

It will be for the Board of Managers to determine how far an improvement, executed within the above estimate, will be justified by the trade it will command. The transportation of coal from the mines near Philipsburg, for the supply of the different markets on the Pennsylvania canal, and to meet the demands of an increasing consumption in several departments of the iron manufacture on the line of the rail-road, may certainly be expected to constitute a large item of tonnage. But other sources of revenue may be looked to with not less confidence. A large part of the district through which the railroad would pass, is understood to be among the most fertile in the state in iron ore, and to present already as large facilities as any other for the production both of pig and bar metal. The furnaces and forges situated on the line of the rail-road, would give even now an important trade to it, in the transportation, not only of the metal produced by them, but of the ore, charcoal, and limestone, required for its production. It is presumed, however, that the amount of iron now produced in the valley of the Little Juniata (and consequently of business which might be reckoned on from its manufacture,) is small, compared with what might be expected, if the proposed improvement should be carried into effect.

Other sources of revenue would be developed in the demands of the country beyond the western termination of the rail-road, which would find its most convenient mode of communication with the eastern part of the State by the rail-road. It will be unnecessary, however, to dwell on these points to the Board of Managers.

Submitting herewith the topographical plan referred to in this report, a field-book of the location established on the ground, and drawings exhibiting a view of the line in plan and profile, on a scale of 200 feet to the inch, I have the honour to be, gentlemen, very respectfully,

Your obedient servant,

MONCURE ROBINSON.

Philadelphia, Oct. 23d, 1833.